IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Patent application of:

Applicant(s):	Andreas Manz et al.
Serial No.:	10/523,035
Filed:	January 5, 2006
Title:	POWDER MIXING MICROCHIP, SYSTEM AND METHOD
Examiner:	David L. Sorkin
Art Unit:	1774
Docket No.	FRYHP0131US

APPEAL BRIEF

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

The undersigned submits this brief for the Board's consideration of the appeal of the Examiner's decision, mailed June 1, 2010, finally rejecting claims 1-43 of the above-identified application.

The fee for filing an appeal brief is being paid herewith. In the event an additional fee or further extension of time is necessary, the Commissioner is authorized to charge any additional fee which may be required, and further to consider this a petition for an extension of time to make the filing of this brief timely, to Deposit Account No. 18-0988 under Docket No. FRYHP0131US.

I. Real Party in Interest

The real party in interest in the present appeal is Imperial College Innovations Limited.

II. Related Appeals and Interferences

Neither appellant, appellant's legal representative, nor the prior assignee of the present application are aware of any appeals or interferences which will directly affect, which will be directly affected by, or which will have a bearing on the Board's decision in the pending appeal.

III. Status of Claims

Claims 1-43 have been finally rejected, and claims 44-71 have been withdrawn from consideration. The claims on appeal are claims 1-43, and a correct copy of these claims is reproduced in the Claims Appendix.

IV. Status of Amendments

No claim amendments were filed subsequent to the issuance of the final Office Action, from which this appeal is taken.

V. Summary of Claimed Subject Matter

The following is a concise explanation of the subject matter defined in each of the independent claims involved in the appeal, which refers to the specification by page and line number in brackets, and to the drawing by reference characters.

Claim 1

1. A powder mixing microchip, comprising:

a powder mixing unit (3) for mixing a plurality of powder components to provide a powder mixture [2/5-7 and 12/20 and 21], the powder mixing unit (3) including a powder mixing channel (5) in which powder components are mixed on being transported therethrough [2/7 and 8 and 12/23 and 24], a powder outlet port (8) through which the powder mixture is delivered [2/8 and 9 and 12/28-30], and a plurality of mixing gas supply channels (7) fluidly connected to the powder mixing channel (5) at spaced locations along a length thereof [2/9-11 and 12/24-26] through which mixing gas flows are delivered to effect mixing of the powder components on being transported through the powder mixing channel (5) [2/11 and 12 and 13/2-6].

VI. Grounds of Objection/Rejection to Be Reviewed on Appeal

A. Claims 1-3 and 5-43 stand rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,883,957 (herein referred to as "Gilbert").

B. Claim 4 stands rejected under 35 U.S.C. § 103(a) as being obvious over Gilbert in view of U.S. Patent No. 3,526,391 (herein referred to as "Church").

VII. Argument

The rejections advanced by the Examiner are improper and should be reversed for at least the following reasons.

Summary

The present application is directed toward a powder mixing microchip for mixing powder components and a powder mixing system incorporating the same. As shown in

Fig. 1 reproduced below, the powder mixing system comprises a microfabricated powder mixing device 1, into which powder components are introduced and mixed to provide a homogeneous powder mixture. The powder mixing device 1 includes a powder mixing unit 3 for mixing a plurality of powder components to provide a homogeneous powder mixture. The powder mixing unit 3 includes a mixing channel 5 in which introduced powder components are mixed on passing therethrough, and a plurality of mixing gas supply channels 7 which are fluidly connected to the mixing channel 5 at spaced locations along the length thereof. The mixing channel 5 may be a linear conduit and includes an outlet port 8 at one, downstream end thereof from which a homogeneous powder mixture is delivered.

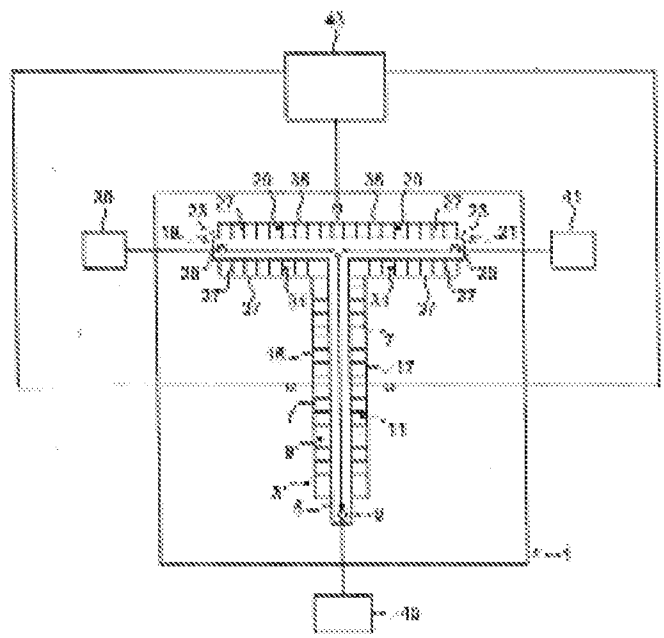

FIG. 1

A. Rejection of claims 1-3 and 5-43 under 35 U.S.C. § 102(e)

Claims 1-3 and 5-43 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Gilbert.

The Examiner's remarks in support of the rejection are as follows:

> In re claims 1 and 38, Gilbert discloses a microchip (see col. 1, lines 30-43) comprising a mixing channel (61 in the embodiment of Fig. 10), an outlet port (62), and a plurality of supply channels (see Fig. 10). Regarding claim 2, the mixing channel is an elongate, linear conduit (see Fig. 10). Regarding claim 3, the mixing channel comprises a series of mixing chambers interconnected by respective conduits (35) of smaller dimension, with the supply channels being fluidly connected to the mixing chambers (see Fig. 10). Claims 5 and 6 fail to further limit the structure being claimed. Regarding claim 7, the supply channels are equally spaced (see Fig. 10). Regarding claims 8-12 and 17, first and second groups of supply channels are fluidly connected to respective ones of opposed sides of the powder mixing channel (see Fig. 10). Regarding claims 13 and 14, first and second groups of supply channels are connected to one side of the powder mixing channel (see Fig. 10). Regarding claims 15 and 16, first and second groups of supply channels are fluidly connected to each of respective ones of opposed sides of the mixing channel (see Fig. 10). Regarding claims 18-37 and 39-43, delivery unit(s) are disclosed (the upstream most "system 10", including 20, 30, 31, 33, 34, 36, 51, 50/500, 40/400 in the embodiment of (Fig. 10). Unit (50/500) capable of supplying gas are disclosed. A unit (50/500) capable of supplying gas is disclosed.

Office Action dated June 1, 2010, pages 2 and 3.

Reversal of the rejection is respectfully requested for at least the following reasons.

Claim 1

Claim 1 of the present invention is directed to a powder mixing microchip which requires *inter alia* ***a powder mixing unit*** for mixing a plurality of powder components to provide a ***powder mixture***.

There is no disclosure in Gilbert *et al* of a powder mixing unit for providing a powder mixture of a plurality of powder components. Rather, Gilbert *et al* is directed to an on-chip dilution system (as shown in Fig. 10, reproduced below) for diluting chemical

compounds, and this on-chip dilution system is not capable of mixing a plurality of powder components to provide a powder mixture.

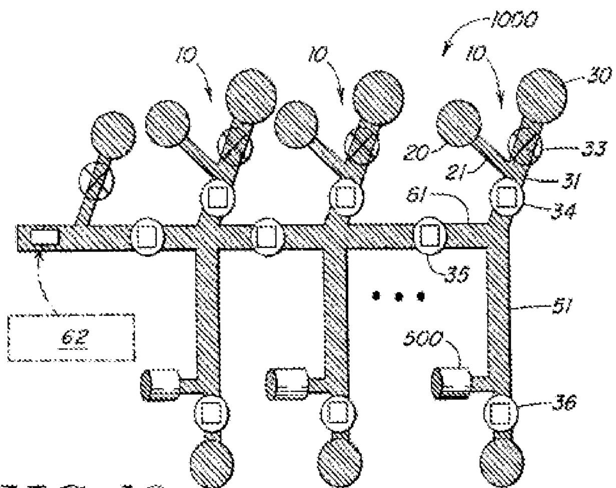

FIG. 10

In Gilbert *et al*, a chemical compound sample, contained in a sample well (20), is diluted with a diluent, contained in a dilution well (30) [column 7, lines 60 and 61 and column 3, lines 53 to 56]. In Gilbert *et al*, dilution is achieved by a first syringe pump (50), which draws diluent from the dilution well (30) and sample from the sample well (20) through dilution channels (31, 51) [column 5, lines 27 to 31], and the dilution ratio is determined by the position of the variable valve (33) [column 5, lines 22 and 23], which regulates the flow of liquid through the dilution channel (31) [column 4, lines 64 to 66].

It appears that the Examiner is suggesting that the on-chip dilution system of Gilbert *et al* is capable of diluting a powder sample, and hence would provide the powder mixing unit of claim 1. This is absolutely not the case.

In Gilbert *et al*, if a powder sample were to be contained in the sample well (20), the action of drawing a diluent flow through the dilution channels (31, 51) would not be to draw powder from the sample well (20). In Gilbert *et al*, sample is drawn from the

sample well (20) by the effect of the first syringe pump (50) only because the chemical compound sample is a liquid, which isolates the sample channel (21) from atmosphere, leading to the creation of a pressure differential, which causes sample to be drawn from the sample well (20) into the sample channel (21) and the dilution channel (31). If a powder sample were to be contained in the sample well (20), no such pressure differential would be created, as the powder sample would not isolate sample channel (21) from atmosphere, and, if the powder sample were packed into the sample well (20) so as to isolate the sample channel (21) from atmosphere, the powder sample would be immovable.

This notwithstanding, even if the on-chip dilution system of Gilbert *et al* were capable of diluting a powder sample, which we submit it manifestly cannot, the diluted sample would be a liquid, as a result of introducing the powder sample into the liquid diluent, whereas as claim 1 contrarily requires that the powder mixing unit provides a ***powder mixture***.

Accordingly, it is submitted that the subject-matter of claim 1 is patentably distinguished over the disclosure of Gilbert *et al*.

As regards the dependent claims (claims 2, 3 and 5 to 43), it is submitted that these claims are dependent upon an allowable independent claim (claim 1), and, as such, are themselves allowable.

It is noted that the Examiner has commented that “unit (50/500)” is capable of supplying gas.

It is presumed that this comment is made in relation to claims 40 to 43, which require *inter alia* at least one gas supply unit for supplying a pressurized gas at least to mixing gas supply channels.

In Gilbert *et al*, the reference signs 50 and 500 are used to designate syringe pumps. There is, however, no disclosure in Gilbert *et al* of the operation of the syringe pumps (50, 500) to generate a pressurized gas. Indeed, such operation would be contrary to the disclosure of Gilbert *et al*, insofar as the use of the syringe pumps (50, 500) to deliver a pressurized gas would be to expel sample from the sample well (20) and diluent from the dilution well (30), rendering the dilution system of Gilbert *et al* inoperable.

As such, it is submitted that the skilled person, contrary to the Examiner's allegation, would have understood the syringe pumps (50, 500) incapable of operating to provide a pressurized gas, in the manner as required by claims 40 to 43.

B. Rejection of claim 4 under 35 U.S.C. § 103(a)

Claim 4 stands rejected under 35 U.S.C. § 103(a) as being obvious over Gilbert in view of Church.

Claim 4 depends from claim 3, which depends on claim 1, and, as such, is allowable for at least the same reasons discussed with respect to claim 1.

VIII. Conclusion

In view of the foregoing, it is respectfully submitted that the claims are patentable over the applied art and that the rejections advance by the Examiner should be reversed.

Respectfully submitted,

RENNER, OTTO, BOISSELLE & SKLAR, L.L.P.

/Patrick F. Clunk/

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Claims Appendix

1. A powder mixing microchip, comprising:

a powder mixing unit for mixing a plurality of powder components to provide a powder mixture, the powder mixing unit including a powder mixing channel in which powder components are mixed on being transported therethrough, a powder outlet port through which the powder mixture is delivered, and a plurality of mixing gas supply channels fluidly connected to the powder mixing channel at spaced locations along a length thereof through which mixing gas flows are delivered to effect mixing of the powder components on being transported through the powder mixing channel.

2. The microchip of claim 1, wherein the powder mixing channel is an elongate, linear conduit.

3. The microchip of claim 1, wherein the powder mixing channel comprises a series of mixing chambers interconnected by respective interconnecting conduits of smaller dimension, with the mixing gas supply channels being fluidly connected to the mixing chambers.

4. The microchip of claim 3, wherein the interconnecting conduits are configured such that inlets and outlets of the mixing chambers are not in opposing relation.

5. The microchip of claim 1, wherein the mixing gas supply channels are configured such as to provide a gas cushion which supports powder components transported through the powder mixing channel.

6. The microchip of claim 1, wherein the mixing gas supply channels are configured such as to provide turbulent gas flows in the powder mixing channel.

7. The microchip of clam 1, wherein the mixing gas supply channels are equi-spaced.

8. The microchip of claim 1, wherein the powder mixing unit includes first and second groups of mixing gas supply channels fluidly connected to respective ones of opposed sides of the powder mixing channel.

9. The microchip of claim 8, wherein the first and second groups of mixing gas supply channels are in opposed relation.

10. The microchip of claim 9, wherein the first and second groups of mixing gas supply channels are at a bottom of the powder mixing channel.

11. The microchip of claim 9, wherein the first and second groups of mixing gas supply channels are at a top of the powder mixing channel.

12. The microchip of claim 8, wherein the first and second groups of mixing gas supply channels are located at respective ones of a top and a bottom of the powder mixing channel.

13. The microchip of claim 1, wherein the powder mixing unit includes first and second groups of mixing gas supply channels fluidly connected to one side of the powder mixing channel.

14. The microchip of claim 13, wherein the first and second groups of mixing gas supply channels are located at respective ones of a top and a bottom of the powder mixing channel.

15. The microchip of claim 1, wherein the powder mixing unit includes first and second groups of mixing gas supply channels fluidly connected to each of respective ones of opposed sides of the powder mixing channel.

16. The microchip of claim 15, wherein the first and second groups of mixing gas supply channels connected to each of the respective sides of the powder mixing channel are located at respective ones of a top and a bottom of the powder mixing channel.

17. The microchip of claim 8, wherein each respective group of mixing gas supply channels is fluidly connected by a manifold.

18. The microchip of claim 1, further comprising:
at least one powder delivery unit for delivering a plurality of powder components to the powder mixing channel.

19. The microchip of claim 18, comprising:
a plurality of powder delivery units for delivering a plurality of powder components to the powder mixing channel.

20. The microchip of claim 18, wherein each powder delivery unit includes a powder delivery channel fluidly connected to the powder mixing channel and through which at least one powder component is delivered to the powder mixing channel, at least one powder inlet port through which at least one powder component is supplied to the powder delivery channel, and a plurality of delivery gas supply channels fluidly connected to the powder delivery channel at spaced locations along a length thereof through which delivery gas flows are delivered at least in part to transport the at least one powder component to the powder mixing channel.

21. The microchip of claim 20, wherein the powder delivery channel is an elongate, linear conduit.

22. The microchip of claim 20, wherein the delivery gas supply channels are configured such as to provide a gas cushion which supports the at least one powder component transported through the powder delivery channel.

23. The microchip of claim 20, wherein the delivery gas supply channels are configured such as to provide turbulent gas flows in the powder delivery channel.

24. The microchip of claim 20, wherein the delivery gas supply channels are equi-spaced.

25. The microchip of claim 20, wherein each powder delivery unit includes first and second groups of delivery gas supply channels fluidly connected to respective ones of opposed sides of the powder delivery channel.

26. The microchip of claim 25, wherein the first and second groups of delivery gas supply channels are in opposed relation.

27. The microchip of claim 26, wherein the first and second groups of delivery gas supply channels are at a bottom of the powder delivery channel.

28. The microchip of claim 26, wherein the first and second groups of delivery gas supply channels are at a top of the powder delivery channel.

29. The microchip of claim 25, wherein the first and second groups of delivery gas supply channels are located at respective ones of a top and a bottom of the powder delivery channel.

30. The microchip of claim 20, wherein each powder delivery unit includes first and second groups of delivery gas supply channels fluidly connected to one side of the powder delivery channel.

31. The microchip of claim 30, wherein the first and second groups of delivery gas supply channels are located at respective ones of a top and a bottom of the powder delivery channel.

32. The microchip of claim 20, wherein each powder delivery unit includes first and second groups of delivery gas supply channels fluidly connected to each of respective ones of opposed sides of the powder delivery channel.

33. The microchip of claim 32, wherein the first and second groups of delivery gas supply channels connected to each of the respective sides of the powder delivery channel are located at respective ones of a top and a bottom of the powder delivery channel.

34. The microchip of claim 20, wherein each respective group of delivery gas supply channels is fluidly connected by a manifold.

35. The microchip of claim 1, further comprising:

a plurality of powder delivery units for delivering a plurality of powder components to the powder mixing channel, wherein each powder delivery unit includes a powder delivery channel fluidly connected to the powder mixing channel and through which at least one powder component is delivered to the powder mixing channel, a single powder inlet port through which at least one powder component is supplied to the powder delivery channel, and a plurality of delivery gas supply channels fluidly connected to the powder delivery channel at spaced locations along a length thereof through which delivery gas flows are delivered at least in part to transport the at least one powder component to the powder mixing channel

36. The microchip of claim 20, wherein at least one powder delivery unit includes a plurality of powder inlet ports.

37. The microchip of claim 20, wherein each powder delivery unit includes a transport gas supply channel fluidly connected to the powder delivery channel for delivering a transport gas flow, separate to the delivery gas flows, through the powder delivery channel, which transport gas flow acts at least in part to transport the at least one powder component to the powder mixing channel.

38. A powder mixing system, comprising:
the microchip of claim 1.

39. The system of claim 38, further comprising:

a plurality of powder delivery units for delivering a plurality of powder components to the powder mixing channel, wherein at least one powder delivery unit includes a plurality of powder inlet ports and a plurality of powder supply units fluidly connected to respective ones of the powder inlet ports for supplying respective ones of the powder components.

40. The system of claim 38, further comprising:
at least one gas supply unit operably fluidly connected to the mixing gas supply channels to supply a pressurized gas thereto.

41. A powder mixing system, comprising:

the microchip of claim 20; and

at least one gas supply unit operably fluidly connected to the mixing gas supply channels and the delivery gas supply channels to supply a pressurized gas thereto.

42. A powder mixing system, comprising:

the microchip of claim 34, comprising:

a plurality of powder delivery units for delivering a plurality of powder components to the powder mixing channel; and

at least one gas supply unit operably fluidly connected to the mixing gas supply channels to supply a pressurised gas thereto, wherein the at least one gas supply unit is operably fluidly connected to the manifolds such as to enable control of relative flow rates of the delivery gas flows in the powder delivery channels of the respective powder delivery units, whereby delivery rates of powder components delivered by respective ones of the powder delivery units can be controlled such as to enable control of a mixing ratio of the powder mixture.

43. A powder mixing system, comprising:

the microchip of claim 37, comprising:

a plurality of powder delivery units for delivering a plurality of powder components to the powder mixing channel; and

at least one gas supply unit operably fluidly connected to the mixing gas supply channels to supply a pressurised gas thereto, wherein the at least one gas supply unit is operably fluidly connected to the transport gas supply channels such as to enable control of relative flow rates of the transport gas flows in the powder delivery channels of the respective powder delivery units, whereby delivery rates of powder components delivered by respective ones of the powder delivery units can be controlled such as to enable control of a mixing ratio of the powder mixture.

Evidence Appendix

None.

Related Proceedings Appendix

None.